

LAKE: ANNABESSACOOK L (VLMP CWD)
TOWN: MONMOUTH
COUNTY: KENNEBEC

MIDAS: 9961
TRUE BASIN: 1
SAMPLE STATION: 1

WHOLE LAKE INFORMATION

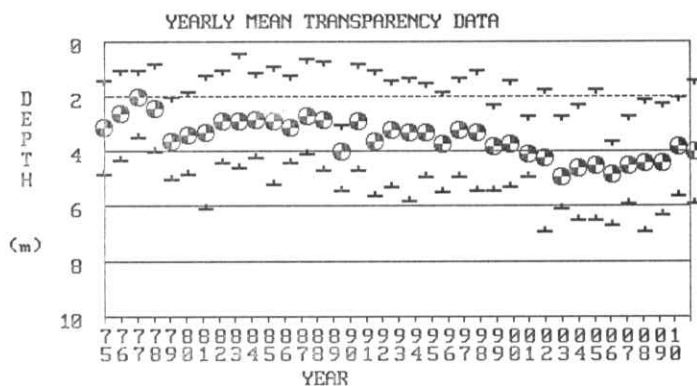
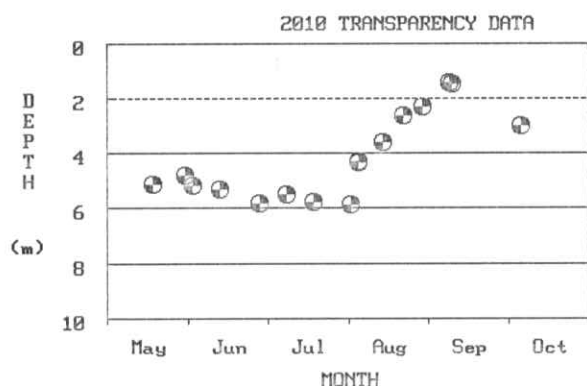
MAX. DEPTH: 15 m. (49 ft.)
MEAN DEPTH: 6 m. (21 ft.)
DELORME ATLAS #: 12
USGS QUAD: WINTHROP
IFW REGION B: Belgrade Lakes (Augusta)
IFW FISH. MANAGMENT: Warmwater

TRUE BASIN CHARACTERISTICS

SURFACE AREA: 563.0 ha. (1391.2 a.)
FLUSHING RATE: 3.67 flushes/yr.
VOLUME: 29470000.0 cu. m. (23906 ac.-ft.)
DIRECT DRAINAGE AREA: 42.94 sq. km. (16.58 sq. mi.)

PLEASE NOTE THE FOLLOWING: The SAMPLE STATION # refers to the location sampled. The term TRUE BASIN is used to define areas within a lake that are separated by shallow reefs or shoals and therefore function as separate lakes. There are approximately 50 lakes in the state that have more than 1 True Basin. True Basin Characteristics are now being included in the first section of these reports to enable users of the Phosphorous Loading Methodology to better evaluate the data. If there is no data for a particular True Basin, True Basin Characteristics must be obtained from the DEP. ANNABESSACOOK L has 1 True Basin(s).

SECCHI DISK TRANSPARENCY GRAPHS:



Note: 2010 graphs may indicate multiple readings taken on a given day.

SUMMARY OF CHEMICAL AND TROPHIC STATE PARAMETERS:

[* indicates that Secchi disk was visible at bottom of lake (or one reading used in calculation was visible)].

YEAR	MEAN	MEAN	MEAN	MEAN	TOTAL PHOS. MEANS (ppb)				SECCHI DISK (m.)				CHLOROPHYLL A(ppb)			TROPHIC STATE INDICES			
	COLOR	pH	ALK	COND.	EPI	SURF	BOT.	PRO.											
	(SPU)		(mg/l)	(uS/cm)	CORE	GRAB	GRAB	GRAB	MIN.	MEAN	MAX.	N	MIN.	MEAN	MAX.	C	G	SEC	CHL
1975	28	7.05	16.5	50	-	29	21	22	1.4	3.1	4.8	5	5.4	5.4	5.4	-	-	75	-
1976	-	6.50	-	-	55	-	-	-	1.0	2.6	4.3	6	4.5	8.9	20.5	89	-	85	69
1977	-	6.90	10.0	65	-	-	223	93	1.0	2.0	3.5	7	3.6	16.3	58.3	-	105	100	86
1978	-	-	-	-	30	28	86	46	0.8	2.4	4.0	7	5.8	17.2	41.8	-	84	89	88
1979	-	6.91	-	-	-	90	77	39	2.0	3.6	5.0	7	3.1	8.0	16.8	-	79	66	66
1980	-	-	-	-	20	-	90	46	1.8	3.4	4.8	7	4.2	9.5	24.1	-	84	69	71
1981	-	-	-	-	-	-	98	46	1.2	3.3	6.1	7	2.9	14.1	42.9	-	84	71	82
1982	-	6.55	-	-	25	-	93	42	1.0	2.9	4.4	7	2.4	14.0	43.8	-	81	78	82
1983	-	-	-	-	-	-	198	73	0.4	2.9	4.6	7	4.8	15.0	70.5	-	98	78	84
1984	-	7.48	-	52	-	-	215	60	1.1	2.8	4.2	7	5.2	17.4	53.2	-	92	80	-
1985	-	7.52	-	59	-	-	214	76	0.9	2.9	5.2	6	5.6	25.4	49.3	-	99	78	-
1986	-	7.55	-	-	-	-	134	43	1.2	3.1	4.4	6	3.7	15.4	38.2	-	82	75	84
1987	-	7.19	9.2	-	-	-	154	63	0.6	2.7	4.1	6	4.3	18.5	34.0	-	93	83	90
1988	-	7.08	14.0	-	-	-	62	31	0.7	2.8	4.7	6	1.2	10.8	22.7	-	-	80	74
1989	-	-	-	-	-	-	-	-	3.0	4.0	5.4	6	2.9	8.9	13.2	-	-	60	69

MIDAS: 9961
*TRUE BASIN: 1
*SAMPLE STATION: 1

YEAR	MEAN	MEAN	MEAN	MEAN	TOTAL PHOS. MEANS (ppb)				SECCHI DISK (m.)				CHLOROPHYLL A(ppb)			TROPIC STATE INDICES			
	COLOR	pH	ALK	COND.	EPI	SURF	BOT.	PRO.	MIN.	MEAN	MAX.	N	MIN.	MEAN	MAX.	EPI PHOS		SEC	CHL
	(SPU)		(mg/l)	(uS												C	G		
				/cm)	CORE	GRAB	GRAB	GRAB											
1990	32	7.08	17.1	-	-	-	152	60	0.8	2.9	4.7	6	2.7	12.8	47.3	-	92	78	79
1991	-	7.02	17.4	-	-	-	61	34	1.0	3.6	5.6	7	3.5	10.7	44.5	-	-	66	74
1992	-	7.07	16.7	-	-	-	-	-	1.4	3.2	5.3	6	4.2	14.2	23.2	-	-	73	82
1993	-	7.03	17.3	-	-	-	180	70	1.3	3.3	5.8	6	9.4	20.0	40.9	-	96	71	92
1994	17	6.94	15.8	-	-	-	93	41	1.5	3.3	4.9	6	4.6	11.6	25.6	-	81	71	76
1995	-	6.90	14.5	-	-	-	65	35	1.8	3.7	5.5	6	-	-	-	-	76	65	-
1996	-	-	-	-	-	-	94	45	1.3	3.2	4.9	5	5.3	9.4	14.6	-	83	73	70
1997	-	6.91	18.0	-	31	11	70	34	1.0	3.3	5.4	6	3.2	17.6	63.3	-	75	71	88
1998	-	-	-	-	-	-	114	48	2.3	3.8	5.4	6	3.8	11.9	20.4	-	85	63	77
1999	-	-	-	-	-	-	132	53	1.4	3.7	5.3	6	5.3	13.6	36.4	-	88	65	81
2000	-	6.99	15.8	-	-	-	62	31	2.7	4.1	4.9	6	5.2	8.7	14.8	-	72	59	68
2001	-	7.02	15.4	-	19	-	124	47	1.7	4.2	6.9	6	3.1	10.3	26.3	58	85	58	73
2002	-	6.97	15.6	-	-	-	77	33	2.7	4.9	6.1	6	4.0	7.6	14.7	-	75	49	64
2003	16	7.04	17.1	-	-	-	132	52	2.3	4.6	6.5	7	3.8	6.8	14.9	-	87	53	61
2004	11	6.98	15.0	-	-	-	140	53	1.7	4.5	6.5	6	3.8	10.3	30.4	-	88	54	73
2005	-	7.00	12.0	-	-	-	95	40	3.6	4.8	6.7	6	3.9	5.8	7.8	-	80	50	57
2006	24	7.02	17.5	83	-	-	118	46	2.7	4.5	5.9	6	2.0	7.8	13.0	-	84	54	65
2007	-	7.08	18.6	-	-	-	133	49	2.1	4.4	6.9	6	2.6	5.9	15.0	-	86	55	57
2008	21	7.00	19.3	80	20	-	160	41	2.2	4.4	6.3	6	1.7	7.0	15.0	-	81	55	62
2009	-	-	20.1	-	-	-	99	33	2.0	3.8	5.6	6	7.0	13.1	22.0	-	74	63	80
2010	-	-	20.3	-	-	-	187	43	1.4	4.0	5.9	6	4.0	15.0	46.0	-	82	60	84
JANUARY:	21	6.97	16.0	65	28	40	120	47	0.4	3.5	6.9	36	1.2	12.1	70.5	74	85	69	75

[illegible]

WATER QUALITY SUMMARY

Annabessacook Lake, Monmouth

Midas: 9961, Basin: Primary-01

The Cobbossee Watershed District (CWD) in conjunction with the Maine Department of Environmental Protection (Maine DEP) and the Volunteer Lake Monitoring Program (VLMP) have collaborated in the collection of lake data to evaluate water quality, track algal blooms, and determine historical water quality trends. This dataset does not include bacteria, mercury, or nutrients other than total phosphorus.

Water quality monitoring data for Annabessacook Lake (primary basin) have been collected since 1975. During this period, 22 years of basic chemical information was collected in addition to 30 years of Secchi Disk Transparencies (SDT). In summary, the water quality of Annabessacook Lake is considered to be poor, however gradually improving, based on historical measures of SDT, total phosphorus (TP), and chlorophyll-a (Chla). The potential for nuisance summertime algal blooms on Annabessacook Lake is high.

Water Quality Measures (primary basin): Annabessacook Lake is a non-colored lake (average color 21 SPU) with an average SDT of 3.4 meters (11.2 feet). The range of upper water column TP for Annabessacook Lake is 19 - 55 parts per billion (ppb) with an average of 30 ppb. Chla ranges from 1.2 - 70.5 ppb with an average of 12.8 ppb. Recent dissolved oxygen (DO) profiles show extensive DO depletion in deep areas of the lake. The potential for phosphorus to leave the bottom sediments and become available to algae in the water column (internal loading) is high.

Comments: Annabessacook Lake has one of the longest histories of lake management and restoration in Maine. The communities around the lake are served by the Cobbossee Watershed District which is the only lake management district in the state. Due to extensive internally recycled phosphorus from the low oxygen sediments, Annabessacook Lake was the first lake in Maine to be treated (1978) with aluminum to reduce the severity of phosphorus loading and algal blooms. This treatment was partially successful, although the lake still experiences high summer algae growth and continued oxygen depletion. CWD has done extensive watershed work to reduce runoff phosphorus and to help guide watershed development to reduce future phosphorus loading. The overall water quality of Annabessacook Lake appears to be gradually improving.

Nutrient Management: An Annabessacook Lake combined Phosphorus Control Action Plan (PCAP) and Total Maximum Daily (Annual Phosphorus) Load (TMDL) report was prepared by Maine DEP during 2002-04, under contract with CWD - with assistance from the Maine Association of Conservation Districts (MACD) project team. Following lake stakeholder and public reviews, this document was approved by US-EPA (New England) on May 18, 2004. This final report, along with the EPA-New England review summary and letter of approval, can be found on the Maine DEP webpage at: <http://www.maine.gov/dep/blwq/docmonitoring/tmdl2.htm>.

See ME-DEP Explanation of Lake Water Quality Monitoring Report for measured variable explanations. Additional lake information can be obtained by contacting CWD at 207-377-2234 or ME-DEP at 207-287-3901 or VLMP at 207-783-7733. Additional lake information can be found on the Internet at <http://www.lakesofmaine.org/> and/or <http://www.maine.gov/dep/blwq/lake.htm>.

LAKE: ANNABESSACOOK L (VLMP CWD)
TOWN: MONMOUTH
COUNTY: KENNEBEC

MIDAS: 9961
TRUE BASIN: 1
SAMPLE STATION: 2

WHOLE LAKE INFORMATION

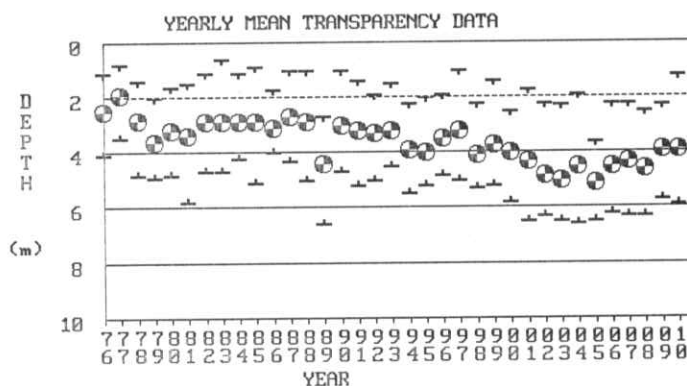
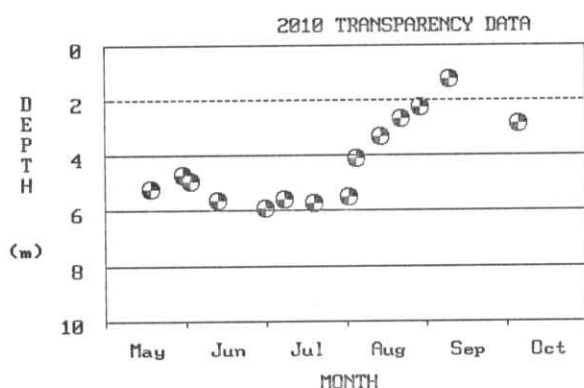
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MEAN DEPTH: 6 m. (21 ft.)
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USGS QUAD: WINTHROP
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IFW FISH. MANAGMENT: Warmwater

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SUMMARY OF CHEMICAL AND TROPHIC STATE PARAMETERS:

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YEAR	MEAN COLOR	MEAN pH	MEAN ALK	MEAN COND.	TOTAL PHOS. MEANS (ppb)				SECCHI DISK (m.)				CHLOROPHYLL A(ppb)			TROPHIC STATE INDICES			
	(SPU)		(mg/l)	(uS)	EPI	SURF	BOT.	PRO.	MIN.	MEAN	MAX.	N	MIN.	MEAN	MAX.	C	G	SEC	CHL
				/cm)	CORE	GRAB	GRAB	GRAB											
1976	-	-	-	-	29	-	-	-	1.1*	2.5*	4.1	6	4.3	18.2	35.0	71	-	-	89
1977	-	7.00	-	-	-	43	24	30	0.8	1.9	3.5	6	16.4	33.0	65.4	-	72	103	-
1978	-	-	-	-	19	-	16	23	1.4	2.8	4.8	7	8.7	14.9	23.4	-	64	80	-
1979	-	6.90	-	-	-	-	-	24	2.0	3.6	4.9	7	4.3	8.1	15.8	-	66	66	66
1980	-	-	-	-	-	14	-	25	1.6	3.2	4.8	7	3.3	11.1	22.1	-	67	73	75
1981	-	-	-	-	-	-	-	23	1.5	3.4	5.8	7	2.4	12.1	30.1	-	65	69	77
1982	-	-	-	-	26	31	-	22	1.1	2.9	4.7	7	4.1	14.4	42.8	-	63	78	82
1983	-	-	-	-	-	-	-	26	0.6	2.9	4.7	7	5.5	15.5	74.2	-	68	78	85
1984	-	7.48	-	53	-	-	-	33	1.1	2.9	4.2	7	6.0	19.2	49.0	-	75	78	-
1985	-	7.16	-	62	-	-	-	24	0.9	2.9	5.1	7	3.8	15.9	31.7	-	-	-	-
1986	-	7.30	-	-	-	-	-	18	1.7	3.1	4.0	4	2.4	10.0	22.5	-	-	-	-
1987	-	7.20	1.5	-	-	-	-	26	1.0	2.7	4.3	6	4.3	17.9	43.1	-	68	83	89
1988	-	7.19	13.0	-	-	20	32	20	1.0	2.9	5.0	6	2.0	8.2	12.5	-	-	78	67
1989	-	-	-	-	-	-	-	-	2.7	4.4	6.6	6	-	-	-	-	-	55	-
1990	-	7.12	17.6	-	18	-	-	24	1.0	3.0	4.7	6	-	-	-	-	66	76	-

MIDAS: 9961
*TRUE BASIN: 1
*SAMPLE STATION: 2

YEAR	MEAN	MEAN	MEAN	MEAN	TOTAL PHOS. MEANS (ppb)				SECCHI DISK (m.)				CHLOROPHYLL A(ppb)			TROPIC STATE INDICES			
	COLOR	pH	ALK	COND.	EPI	SURF	BOT.	PRO.	MIN.	MEAN	MAX.	N	MIN.	MEAN	MAX.	EPI PHOS		SEC	CHL
	(SPU)		(mg/l)	(uS												C	G		
				/cm)	CORE	GRAB	GRAB	GRAB											
1991	-	7.09	16.5	-	-	-	-	22	1.4	3.2	5.2	5	-	-	-	-	63	73	-
1992	-	7.07	16.7	-	-	-	-	-	1.9	3.3	5.0	6	-	-	-	-	-	71	-
1993	-	7.04	17.3	-	-	-	-	21	1.5	3.2	4.5	6	-	-	-	-	62	73	-
1994	18	6.99	16.1	-	-	-	-	20	2.2	3.9	5.5	6	-	-	-	-	61	62	-
1995	-	6.90	15.0	-	-	-	-	17	2.0	4.0	5.2	6	-	-	-	-	56	60	-
1996	-	-	-	-	-	-	-	19	1.9	3.5	4.8	5	-	-	-	-	59	68	-
1997	-	-	-	-	-	-	-	22	1.0	3.2	5.0	6	-	-	-	-	63	73	-
1998	-	-	-	-	-	-	-	19	2.2	4.1	5.3	6	3.6	10.6	22.6	-	58	59	74
1999	-	-	-	-	-	-	-	20	1.4	3.7	5.2	6	5.7	13.9	31.1	-	60	65	81
2000	-	6.98	16.2	-	-	-	-	23	2.5	4.0	5.8	6	4.0	8.2	17.4	-	64	60	66
2001	-	6.99	16.1	-	21	-	-	17	1.7	4.3*	6.5*	6	2.3	10.8	26.5	62	-	-	74
2002	-	6.94	16.1	-	-	-	-	16	2.2	4.8	6.3	6	3.2	7.4	11.2	-	55	50	64
2003	13	7.09	17.4	-	13	-	-	-	2.3	5.0	6.5	6	3.6	6.3	17.7	49	-	48	59
2004	12	6.96	14.8	-	16	-	-	-	1.9	4.5*	6.6*	6	2.9	6.5	17.1	54	-	-	60
2005	-	7.00	10.0	-	-	-	-	14	3.6	5.1*	6.5*	6	3.0	4.5	6.4	-	51	-	50
2006	-	7.00	17.8	-	14	-	-	-	2.2	4.5	6.2	6	3.1	9.0	18.0	50	-	54	69
2007	-	7.09	19.0	-	14	-	-	-	2.2	4.3*	6.3*	6	3.1	5.8	14.0	50	-	-	57
2008	-	6.98	18.8	-	12	-	-	-	2.5	4.6*	6.3*	6	3.0	6.8	12.0	47	-	-	61
2009	-	-	20.2	-	15	-	-	-	2.3	3.9	5.7	6	2.6	7.7	14.0	53	-	62	65
2010	-	-	20.6	-	20	-	-	-	1.2	3.9	5.9	6	3.0	14.2	45.0	61	-	62	82
MMARY:	14	7.05	15.8	57	18	27	24	22	0.6*	3.6*	6.6	35	2.0	11.9	74.2	55	63	69	72

[illegible]

WATER QUALITY SUMMARY

Annabessacook Lake, Monmouth
Midas: 9961, Basin: Secondary-02

The Cobbossee Watershed District (CWD) in conjunction with the Maine Department of Environmental Protection (Maine DEP) and the Volunteer Lake Monitoring Program (VLMP) have collaborated in the collection of lake data to evaluate water quality, track algal blooms, and determine historical water quality trends. This dataset does not include bacteria, mercury, or nutrients other than total phosphorus.

Water quality monitoring data for Annabessacook Lake (secondary basin) have been collected since 1976. During this period, 18 years of basic chemical information was collected in addition to 29 years of Secchi Disk Transparencies (SDT). In summary, the water quality of Annabessacook Lake is considered to be poor, however gradually improving, based on historical measures of SDT, total phosphorus (TP), and chlorophyll-a (Chla). The potential for summertime nuisance algal blooms on Annabessacook Lake is high.

Water Quality Measures (secondary basin): Annabessacook Lake is a non-colored lake (average color 14 SPU) with an average SDT of 3.4 meters (11.2 feet). The range of upper water column TP for Annabessacook Lake is 13 - 29 parts per billion (ppb) with an average of 20 ppb. Chla ranges from 2.0 - 74.2 ppb with an average of 13.1 ppb. Recent dissolved oxygen (DO) profiles show extensive DO depletion in deep areas of the lake. The potential for phosphorus to leave the bottom sediments and become available to algae in the water column (internal loading) is high.

Comments: Annabessacook Lake has one of the longest histories of lake management and restoration in Maine. The communities around the lake are served by the Cobbossee Watershed District which is the only lake management district in the state. Due to extensive internally recycled phosphorus from the low oxygen sediments, Annabessacook Lake was the first lake in Maine to be treated with aluminum (1978) to reduce the severity of phosphorus loading and algal blooms. This treatment was partially successful, although the lake still experiences high summer algae growth and continued oxygen depletion. CWD has done extensive watershed work to reduce runoff phosphorus and to help guide watershed development to reduce future loading. The overall water quality of Annabessacook Lake appears to be gradually improving.

Nutrient Management: An Annabessacook Lake combined Phosphorus Control Action Plan (PCAP) and Total Maximum Daily (Annual Phosphorus) Load (TMDL) report was prepared by Maine DEP during 2002-04, under contract with CWD - with assistance from the Maine Association of Conservation Districts (MACD) project team. Following lake stakeholder and public reviews, this document was approved by US-EPA (New England) on May 18, 2004. This final report, along with the EPA-New England review summary and letter of approval, can be found on the Maine DEP webpage at: <http://www.maine.gov/dep/blwq/docmonitoring/tmdl2.htm>

See ME-DEP Explanation of Lake Water Quality Monitoring Report for measured variable explanations. Additional lake information can be obtained by contacting CWD at 207-377-2234 or ME-DEP at 207-287-3901 or VLMP at 207-783-7733. Additional lake information can be found on the Internet at <http://www.lakesofmaine.org/> and/or <http://www.maine.gov/dep/blwq/lake.htm>.

Filename: ANN29961, revised: 03/2005, by dbh